

REMARKS

Claims 1-18 have been canceled. New Claims 19-37 active in the case.

Reconsideration of this application is requested.

The present invention relates to a process of producing a resin encapsulated semiconductor device.

Claim Amendments

The original claims that are directed to a flame retardant have been canceled in favor of a process for producing a resin encapsulated semiconductor device. Support for new Claim 19 can be found in original Claim 1 and in the text, for instance, at page 7, lines 6-11 and in Items (3) and (4) of Example 1. Support for new Claims 20-34 can be found in original Claims 2-15. Support for new Claim 36 can be found in original Claim 1 and Items (3) and (4) of Example 1 and on page 7, lines 6-11. Finally, support for new Claim 37 can be found in Items (3) and (4) of Example 1 and page 7, lines 6-11. None of the newly submitted claims introduce new matter into the case. Entry of the new claims is respectfully requested.

Claim Objection

The objection to Claim 4 is obviated in new Claim 22. Basis for the amendment can be found on page 8, lines 4-6 and by the fact that one of skill in the art would understand that a phenol aralkyl XL-255 resin is manufactured by Mitsui Chemical Inc. Entry of the amendment is respectfully requested.

Invention

The present invention is directed to a process for producing a resin encapsulated semiconductor device comprising a semiconductor device and a cured product of a flame

retardant epoxy resin composition, by molding on said semiconductor device a flame retardant epoxy resin composition comprising (A) a halogen-free epoxy resin with at least 2 epoxy groups within each molecule, (B) a curing agent, and (C) a foaming agent, and curing the molded composition to form said cured product to encapsulate the semiconductor device within the cured product.

Prior Art Rejection

Claims 1-3, 7, 8 and 10-16 stand rejected based on 35 USC 102 as anticipated by Yada et al, U. S. Patent 5,271,612. This ground of rejection is respectfully traversed.

The Yada et al patent discloses a structural body for vehicles which are light-weight and rigid and exhibit good vibration damping and heat resistance. The structural body has a two layer or three layer structure comprising a sublayer sheet that is formed of a foamed thermoset resin and a later fusion bonded to the sublayer. The thermosetting resin composition of the sublayer is an epoxy resin containing a foaming agent and a curing agent. From his description of the reference it is clear that there is no teaching or suggestion of the present invention of a method of producing a resin encapsulated semiconductor device, whereby an encapsulating flame-retardant resin composition is molded and cured about the semiconductor device. The process of the invention is especially noteworthy, because the epoxy resin based flame-retardant resin composition exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Because the present composition does not contain brominated epoxy resins or antimony trioxide, it does not suffer environmental or human toxicity problems. The outstanding property aspects of the encapsulating epoxy resin composition of the present invention as mentioned immediately above are described on page 1, lines 15-18; page 2, lines 12-17 and page 9, line 15 to page 10, line 3. The outstanding property aspects of the encapsulating epoxy resin composition of

the present invention as mentioned immediately above are described on page 1, lines 15-18; page 2, lines 12-17 and page 9, line 15 to page 10, line 3, and in fact, are not suggested by the disclosure of the Yada et al patent, and for that matter, any of the cited and applied references. Clearly, the Yada et al patent does not anticipate the present invention and withdrawal of the rejection is respectfully requested.

Claims 1-3, 7, 8 and 10-16 stand rejected based on 35 USC 102 as anticipated by Kagoshima et al, U. S. Patent 5,274,006. This ground of rejection is respectfully traversed.

The Kagoshima et al patent discloses a foamable epoxy resin composition that is comprised of an epoxy resin, a curing agent and a foaming agent, wherein the objective of the disclosure is to provide a liquid material that produces a light, rigid and dense foamed material and which strongly adheres even to anti-rust oil treated metal and which possesses good heat resistance. The liquid material can be applied to various surfaces such as in automobiles household electrical appliances, building materials and the like. Nowhere, however, does the patent suggest the method of the present invention of encapsulating a semiconductor device with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, as in the case of the Yada et al patent, Kagoshima et al does not show the present invention and withdrawal of the rejection is respectfully requested.

Claims 1-3 and 7-16 stand rejected based on 35 USC 102 as anticipated by Lamon et al, U. S. Patent 5,453,453. This ground of rejection is respectfully traversed.

The Lamon et al patent discloses a fire-resistant, halogen-free epoxy composition that emits low amounts of smoke and toxic gas. The composition is useful in aerospace applications for bonding, sealing and/or insulating metal, plastic and composite parts. There is, however, no teaching or suggestion of encapsulating a semiconductor device with a

molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, for the same reasons as advanced above, it is believed that the Lamon et al patent does not anticipate or obviate the invention as claimed and withdrawal of the rejection is respectfully requested.

Claims 1-3 and 7-16 stand rejected based on 35 USC 102 as anticipated by Close, U. S. Patent 5,996,167. This ground of rejection is respectfully traversed.

The Close patent describes surface treating articles such as flap brushes, cleaning brushes, bristle brushes and the like, wherein the abrasive or surface treating segments of the article are affixed to a rotatable core with an expansive adhesive. The expansive adhesive of the patent is described in column 6 as an essentially halogen-free, one-part epoxy composition that also contains a curing agent and a foaming agent. Nowhere, however, is there a teaching or suggestion of encapsulating a semiconductor device with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, the patent fails to anticipate the present invention as claimed and withdrawal of the rejection is respectfully requested.

Claims 1-3, 7, 8, 10-13, 15 and 16 stand rejected based on 35 USC 102 as anticipated by Harrison, U. S. Patent 6,376,564. This ground of rejection is respectfully traversed.

The Harrison patent discloses a foamable epoxy resin composition which is stated as being useful in the manufacture of reinforced structural members (abstract). The text at column 6, lines 43-52 indicates that the foamable resin material, that contains a curing system and a foaming agent, is useful in maintaining or increasing the strength of structural members such as rockers, pillars, radiator support beams, doors and the like. Thus, there is clearly no teaching or suggestion in the patent of a process for encapsulating a semiconductor device

with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, the patent fails to anticipate the present invention as claimed and withdrawal of the rejection is respectfully requested.

Claims 1-8 and 10-16 stand rejected based on 35 USC 102 as anticipated by Czaplicki et al, U. S. Patent 6,846,559. This ground of rejection is respectfully traversed.

The Czaplicki et al patent discloses what is termed an activatable material that may be employed for sealing, baffling, reinforcing, structural bonding and the like. The activatable material is said to expand by heat or some other condition. The material is comprised of an epoxy resin, a blowing agent and a curing agent. The expandable material disclosed is said to be useful in providing articles with structural integrity and for producing acoustical damping of articles or for sealing articles. Examples of such articles include household or industrial appliances such as furniture, storage containers, buildings and the like. Again, however, there is no teaching or suggestion in the patent of a process for encapsulating a semiconductor device with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, the patent fails to anticipate the present invention as claimed and withdrawal of the rejection is respectfully requested.

Claims 17 and 18 stand rejected based on 35 USC 102(b) or 35 USC 103 as anticipated by or rendered obvious over Kagoshima et al, U. S. Patent 5,274,006. This ground of rejection is respectfully traversed.

The Examiner states that the Kagoshima et al patent teaches the limitations of present claim 1. However, applicants maintain to the contrary that the teaching of the use of an foamable epoxy resin composition to provide a household electric appliance with a rigid and heat resistant component is not tantamount to teaching or suggesting the encapsulation of a

semiconductor device with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, the patent fails to suggest the present invention as claimed and withdrawal of the rejection is respectfully requested.

Claims 1-3 and 7-16 stand rejected based on 35 USC 102 or 35 USC 103 as anticipated by or rendered obvious over Lamon et al, U. S. Patent 5,453,453. This ground of rejection is respectfully traversed.

The Lamon et al patent, as discussed above, discloses a fire-resistant, halogen-free epoxy composition that emits low amounts of smoke and toxic gas. The composition is useful in aerospace applications for bonding, sealing and/or insulating metal, plastic and composite parts. There is, however, no teaching or suggestion of encapsulating a semiconductor device with a molded, flame-retardant epoxy resin composition, thereby providing the device with an encapsulating material that exhibits excellent flame retardancy, resistance to high temperatures and humidity and reliability. Accordingly, it is believed that the Lamon et al patent does not anticipate or obviate the invention as claimed and withdrawal of the rejection is respectfully requested.

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It is submitted that this application is now in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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